# C. TECHNICAL DATA

## 1. Features and Benefits

| | |
|---|---|
| **Safety** | Meets CE and IEC 1010 requirements. UL Listed to U.S. and Canadian Safety Standards. |
| **True RMS** | Needed to accurately measure non-sinusoidal AC voltage and current waveforms found on many controls and circuits. |
| **Triple Display** | Shows more than one reading simultaneously. |
| **Analog Bar Graph** | Shows rapidly changing input signals that the normal display will not. |
| **Two-Hold System** | Holds two readings on the display at the same time. |
| **Sleep** | Automatically powers instrument down after 30 minutes of inactivity, yet will continue acquiring data in its various modes. Pressing any push button or turning the rotary switch returns the 183/185 to normal. |
| **Record** | Records Min/Max and Average values. Time reference when value was obtained. |
| **Compare** | Compares stored value with measured value for matching components. |
| **Relative Percentage** | Displays measured value as a % of stored value for checking component tolerances. |
| **RS232 Output** | Transfers data directly to a PC while measuring. |
| **Back Light** | Allows viewing in any light condition. |
| **Autorange** | Automatically selects the best range for the measurement. |



## 2. Product Applications

Perform the following tests and/or measurements with the TPI 183/185 and the appropriate function:

**HVAC/R**

| | |
|---|---|
| **DCmV** | • Thermocouples in furnaces or gas applications. |
| **ACA** | • Heat anticipator current in thermostats. |
| **ACV** | • Line voltage. |
| **ACV or DCV** | • Control circuit voltage. |
| **DCμA** | • Flame safeguard control current. |
| **OHMS** | • Heating element resistance (continuity). |
| **OHMS** | • Compressor winding resistance. |
| **OHMS** | • Contactor and relay coil resistance. |
| **OHMS** | • Continuity of wiring. |
| **CAP** | • Motor start and run capacitance. |
| **Hz/FREQ** | • Frequency on controls and line voltage. |
| **REC** | • Record min/max voltage of controls and line voltages. |
| **DCmV** | • Temperature with optional temperature adapter (A310). |
| **ALL** | • Bar graph to indicate rapid fluctuations in measurements. |

**ELECTRICAL**

| | |
|---|---|
| **ACV** | • Measure line voltage. |
| **OHMS** | • Continuity of circuit breakers. |
| **Hz/FREQ** | • Frequency of line and control voltage. |
| **DCV** | • Voltage of direct drive DC motors. |

**ELECTRONIC**

| | |
|---|---|
| **ACV** | • Measure power supply voltage. |
| **OHMS** | • Continuity of circuit breakers. |
| **REL%** | • Match components |
| **COMP** | • Compare readings in circuits or components |
| **Hz/FREQ** | • Frequency of line and control voltage. |

## 3. Specifications

CE **IEC 1010 Over Voltage:**
CAT II - 1000VDC ,750VAC
CAT III - 600V
Pollution Degree 2

c UL us
LISTED
UL 3111-1

## ※ INSTALLATION Ⅰ · Ⅱ · Ⅲ

**INSTALLATION CATEGORY(OVERVOLTAGE CATEGORY)** Ⅰ
: Signal level, special equipment or parts of equipment, telecommunication, electronic etc., with smaller transient overvoltages than INSTALLATION CATEGORY Ⅱ .

**INSTALLATION CATEGORY(OVERVOLTAGE CATEGORY)** Ⅱ
: Local level, appliances, PORTABLE EQUIPMENT etc., with smaller transient overvoltages than INSTALLATION CATEGORY Ⅲ .

**INSTALLATION CATEGORY(OVERVOLTAGE CATEGORY)** Ⅲ
: Distribution level, fixed installation, with smaller transient overvoltages than INSTALLATION CATEGORY Ⅳ .



## 3. Specifications (cont.)

### a. DCV

| Range | Resolution | Accuracy | Impedance |
|---|---|---|---|
| 400mV | 0.1mV | ±0.3% of reading, ±2 digits | 10MΩ |
| 4V | 0.001V | | |
| 40V | 0.01V | | |
| 400V | 0.1V | | |
| 1000V | 1V | | |

### b1. ACV (45Hz to 450Hz)

| Range | Resolution | Accuracy | Impedance |
|---|---|---|---|
| 4V | 0.001V | ±0.75% of reading, ±5 digits | 10MΩ |
| 40V | 0.01V | | |
| 400V | 0.1V | | |
| 750V | 1V | | |

### b2. ACV (450Hz to 5kHz)

| Range | Resolution | Accuracy | Impedance |
|---|---|---|---|
| 4V | 0.001V | unspecified | 10MΩ |
| 40V | 0.01V | ±2% of reading, ±5 digits | |
| 400V | 0.1V | | |
| 750V | 1V | | |

### b3. ACV (5kHz to 20kHz)

| Range | Resolution | Accuracy | Impedance |
|---|---|---|---|
| 4V | 0.001V | unspecified | 10MΩ |
| 40V | 0.01V | ±2.5% of reading, ±5 digits | |
| 400V | 0.1V | | |
| 750V | 1V | unspecified | |

## 3. Specifications (cont.)

### c. DCA

| Range | Resolution | Accuracy | Overload Protection |
|---|---|---|---|
| 400µA | 0.1µA | ±0.5% of reading, ±5 digits | Fuse**(fast blow) F600V, .5A, 31CM |
| 4000µA | 1µA | | |
| 40mA | 0.01mA | | |
| 400mA | 0.1mA | | |
| 4A | 0.001A | ±0.75% of reading, ±5 digits | Fuse**(fast blow) F600V, 10A, 31CM |
| 10A | 0.01A | | |

### d. ACA

| Range | Resolution | Accuracy | Overload Protection |
|---|---|---|---|
| 400µA | 0.1µA | ±0.75% of reading, ±5 digits | Fuse**(fast blow) F600V, .5A, 31CM |
| 4000µA | 1µA | | |
| 40mA | 0.01mA | | |
| 400mA | 0.1mA | | |
| 4A | 0.001A | ±1.5% of reading, ±5 digits | Fuse**(fast blow) F600V, 10A, 31CM |
| 10A | 0.01A | | |

### e. OHM (Resistance,Ω)

| Range | Resolution | Accuracy | Overload Protection |
|---|---|---|---|
| 400Ω | 0.1Ω | ±0. 5% of reading, ±5 digits | 600V DC or AC Peak |
| 4kΩ | 0.001kΩ | | |
| 40kΩ | 0.01kΩ | | |
| 400kΩ | 0.1kΩ | | |
| 4MΩ | 0.001MΩ | ±1% of reading, ±10 digits | |
| 40MΩ | 0.01MΩ | | |

### f. Diode Test

| Test Voltage | Max Test Current | Over Load Protection |
|---|---|---|
| 3V | Approx. 2.5mA | 600 V DC or Peak AC |

⚠ **Warning: Use only correct size, voltage and current rated fuses.
Test Leads: Use only correct type and overvoltage category rating.



## 3. Specifications (cont.)

### g. Continuity Buzzer

| Test Voltage | Threshold | Over Load Protection |
|---|---|---|
| 3V | 100 digits | 600 V DC or Peak AC |

### h. Capacitance (183)

| Range | Resolution | Accuracy | Over Load Protection |
|---|---|---|---|
| 10µF | 0.01µF | ±2% of reading, ±5 digits | 600V DC or Peak AC |
| 100µF | 0.1µF | | |
| 1000µF | 1µF | | |
| 10,000µF | 1µF | ±3% of reading, ±7 digits | |

### i. Capacitance (185)

| Range | Resolution | Accuracy | Over Load Protection |
|---|---|---|---|
| 4nF | 0.01nF | ±2% of reading,±10 digits | 600V DC or Peak AC |
| 40nF | 0.1nF | ±2% of reading | |
| 400nF | 1nF | ±5 digits | |
| 4000nF | 1nF | | |

### j. Frequency

| Range | Resolution | Accuracy | Over Load Protection |
|---|---|---|---|
| 200.00Hz | 0.01Hz | ±0.05% of reading, ±2 digits | 600V DC or Peak AC |
| 2.0000kHz | 0.0001kHz | | |
| 20.000kHz | 0.001kHz | | |
| 200.00kHz | 0.01kHz | | |

## 3. Specifications (cont.)

### I. General Specifications

| | |
|---|---|
| **Max. Volt. between any Input and Ground** | 1000V |
| **Fuse Protection** | **mA:** 0.5Amp/600VAC; **A:** 10Amp/600VAC |
| **Display Type, Digital:** | 4,000 Count, 4 times per second update |
| **Analog:** | 2x41 segments, 20 times per sec. update |
| **Operating Temp.** | -0° to 40°C (32° to 113°F) |
| **Storage Temp.** | -20° to 60°C (-4° to 140°F) |
| **Relative Humidity** | **0% to 80%:** (0° - 35°C/32° - 95°F)<br>**0% to 70%:** (35° - 55°C/95° - 131°F) |
| ***Temp. Coefficient*** | *0.1 x (Specified Accuracy) per °C for temperature <18°C to >28°C* |
| **Altitude operating** | 6,562ft (2,000meter) |
| **Non-operating** | 40,000ft (12,000meter) |
| **Power Supply** | 9 Volt Battery |
| **Battery Life** | 100 hrs. Alkaline |
| **Size (H x L x W)** | 33mm x 86mm x 187mm (1.3" x 3.4" x 7.4") |
| **Weight** | 660g (23.3oz) |



## D. MEASUREMENT TECHNIQUES

### 1. Controls and Functions:

***Push Buttons***

Activates Back Light for the LCD (automatically turns off after approx. 70 sec.)

**REC** Activates the Min/Max/Ave mode.

**COMP** Activates the Compare mode.

**REL%** Activates the REL% mode.

**RANGE** Activates manual ranging.

**EDIT** Activates the EDIT mode for the Compare and Relative % functions.

**HOLD** Activates two-hold data-hold mode.

Activates special dual functions on LCD. (Min/Max time reference)

***Rotary Switch***

**Off** Turns the instrument off.

**mV** Selects the DC mV function.

**V** Selects the DCV function.

**VHz** Selects the ACV function. (Push the yellow button to display frequency of measured voltage on lower display.)

Selects the diode test function.

Selects resistance function. (Push yellow button to activate continuity buzzer.)

**mA** Selects the DC mA function.

**A** Selects the DCA function. (10A max.)

**A** Selects the ACA function. (10A max.)

**mA** Selects the AC mA function.

Selects the Capacitance function.

**Hz** Selects the Frequency function.

## 183/185 SPECIFICATIONS ±0.3% Basic DCV Accuracy

| Function | Range | Resolution |
|---|---|---|
| DCV | 400mV | 0.1mV |
| | 4V | 0.001V |
| | 40V | 0.01V |
| | 400V | 0.1V |
| | 1000V | 1V |
| ACV | 4V | 0.001V |
| | 40V | 0.01V |
| | 400V | 0.1V |
| | 750V | 1V |
| DCA | 400µA | 0.1µA |
| | 4000µA | 1µA |
| | 40mA | 0.01mA |
| | 400mA | 0.1mA |
| | 4A | 0.001A |
| | 10A | 0.01A |
| ACA | 400µA | 0.1µA |
| | 4000µA | 1µa |
| | 40mA | 0.01mA |
| | 400mA | 0.1mA |
| | 4A | 0.001A |
| | 10A | 0.01A |
| OHM | 400Ω | 0.1Ω |
| | 4kΩ | 0.001kΩ |
| | 40kΩ | 0.01kΩ |
| | 400kΩ | 0.1kΩ |
| | 4MΩ | 0.001MΩ |
| | 40MΩ | 0.01MΩ |
| Capacitance (183) | 10µF | 0.01µF |
| | 100µF | 0.1µF |
| | 1000µF | 1µF |
| | 10,000µF | 1µF |
| Capacitance (185) | 4nF | 0.01nF |
| | 40nF | 0.1nF |
| | 400nF | 1nF |
| | 4000nF | 1nF |

| | Test Voltage | Max Test Current |
|---|---|---|
| Diode | 3V | Approx. 2.5mA |

| | Test Voltage | Threshold |
|---|---|---|
| Continuity | 3V | 100 digits |

**See Pages 12-13 for Frequency, and General Specifications.**